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Improving Chronic Hepatitis B Virus Screening at a Safety-Net Primary Care Clinic

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Abstract

Hepatitis B Virus (HBV) is a type of virus that affects the liver. Chronic hepatitis B is usually asymptomatic and many HBV carriers remain unaware of their viral status, thereby may unknowingly transmit the disease. If left untreated or undetected, it could lead to cirrhosis, hepatocellular carcinoma or mortality. Although this virus is endemic in some parts of the world such as Asia and Africa, it is important to note that HBV has become a global problem. The Centers for Disease Control and Prevention (CDC) in conjunction with the United States Preventive Services Task Force (USPSTF) estimates that about 700,000 to 2.2 million people in the United States have chronic hepatitis B (CHB) and about 14,000 die yearly as a result of complications from the virus. Hence, they recommend that screening be offered to individuals at high risk for hepatitis B virus. People at risk include but are not limited to individuals born in countries of high HBV endemicity (≥2%), injection drug users, men who have sex with men, HIV positive patients, household and sexual contacts of people with HBV, individuals who are incarcerated, and people infected with hepatitis C virus.

This Doctor of Nursing Practice (DNP) quality improvement project was conducted at the Order of Malta Clinic in Oakland, California, a safety-net clinic that provides free health care services to individuals who are uninsured, low income and the working poor in the community. This clinic serves a huge population of immigrants (about 90% of their patient population) eligible for chronic hepatitis B screening but based on observations and review of patients' chart, it was noted that only about 33% of eligible patients were screened. There is currently no protocol for chronic hepatitis B screening at this clinic, instead patients are screened based on presenting symptoms. Hence, this project sought to improve the screening rates for chronic hepatitis B from 33% to 70% at the Order of Malta clinic using the HBsAg blood test by October

2019. This was accomplished by interviewing the providers individually and providing in-service training to physicians and nurse practitioners on the current HBV screening guidelines. A random retrospective review of patients' chart was done in order to get a sense of the overall percentage of eligible patients that were screened. This included a 3-4 weeks of intervention period and 10 weeks of implementation. After the intervention and implementation, patients' charts were once again randomly reviewed in order to evaluate the outcome of the project.

The motivation for carrying out this project was to improve the screening rate for chronic hepatitis B, and treat individuals with a positive result so as to delay or prevent the sequelae that comes with the virus. The long-term benefit would be to improve overall health and wellbeing, and also decrease the cost of treating hepatitis B associated complications such as cirrhosis, liver failure and liver cancer.

Section II. Introduction

Problem Description

Hepatitis B virus (HBV) is a global health epidemic and a serious health hazard. Hepatitis is defined as an inflammation of the liver (CDC, 2014). Hepatitis B virus is a kind of virus that attacks the liver, and could cause both acute and chronic disease, and according to the World Health Organization, hepatitis B is a life-threatening liver infection caused by the hepatitis B virus (WHO, 2018). Hepatitis B virus is spread from individuals who are infected to those who are not immune (Teo & Lok, 2018). This could happen through sharing of needles, sexual contact, or from mother to baby at birth (CDC, 2015). Teo and Lok (2018) noted that there are different modes of transmission of HBV but the predominant mode varies in different geographical locations. In high prevalence areas, mother-child transmission remains the most predominant mode of transmission while horizontal transmission is predominant in intermediate areas; unprotected sexual contact and injection drug use are major modes of transmission in low prevalence areas (Teo & Lok, 2018). Hepatitis B virus has a long incubation period of about 30 to 180 days and an average of 75 days, and it can survive outside of the body for at least 7 days (WHO, 2018). When hepatitis B virus enters the body, it could be detected within 30 days during the acute phase, if it persists, it could develop into a chronic phase. It is imperative to note that acute hepatitis B infection could easily become chronic as it is frequently asymptomatic, and it is the leading cause of cirrhosis and hepatocellular carcinoma in the United States and globally (CDC, 2014).

Chronic hepatitis B virus infection, defined as hepatitis B surface antigen (HBsAg) positivity for at least 6 months, is a major cause of morbidity and mortality worldwide (CDC, 2014). Wilkins, Sams, and Carpenter (2019) defined chronic hepatitis B as the persistence of

hepatitis B surface antigen for more than six months. They went ahead to state that although individuals who have chronic hepatitis B are at risk of hepatocellular carcinoma and cirrhosis, that morbidity and mortality are reduced with adequate treatment (Wilkins et. al, 2019). This also was supported by the findings of Mitruka et. al (2019), which found that without diagnosis and treatment, 15–25% of an estimated 240 million persons with chronic hepatitis B infection worldwide will die prematurely from long term sequelae of cirrhosis, liver failure, and hepatocellular carcinoma (Mitruka et.al, 2019).

According to the U.S. Preventative Services Task Force, approximately 700,000 to 2.2 million persons in the United States have chronic hepatitis B virus infection (USPSTF, 2014). An estimated 2 billion people worldwide are infected with HBV and 380 million people are chronic carriers. There is also a report of 4.5 million new infections and about 620,000 deaths yearly (Lemoine, Nayagam & Thurz, 2013), this number is markedly increasing by the year. A more recent data by the World Health Organization showed an estimate of 887,000 HBV related deaths in 2015 (WHO, 2018). Campbell et.al (2018) stated that between 850,000 and 2,200,000 people in the United States are infected with chronic HBV. Most of these individuals were born in countries with high HBV prevalence rates which include Asia, Africa, South and Central America (Campbell, Lopez, Liu, Bhuket & Wong, 2018). Teo and Lok (2018) found that the overall prevalence of chronic hepatitis B is reported to be 3.6%, however, this number varies based on the geographical location. The prevalence of chronic HBV ranges from <2% in low prevalence areas such as the United States, Canada, and Western Europe to 2-7% in intermediate prevalence areas and ≥8% in high prevalence areas such as Western Africa (Teo & Lok, 2018). Even though HBV is highly preventable with the advent of Hepatitis B vaccination or immunization which remains the most effective means to prevent HBV transmission (Drutz,

2019), the number of people infected remains high. This clearly points to a gap in screening. Hence, the U.S. Preventative Services Task Force (USPSTF) recommends screening for chronic HBV in high risk individuals. "High risk" is defined as immigrants from a country of origin with a ≥2% prevalence of chronic HBV, HIV positive patients, intravenous drug users, and previously incarcerated individuals (USPSTF, 2014).

Geographic Distribution of Chronic Hepatitis B Virus

Hepatitis B virus is found worldwide but differs in endemicity. According to the World Health Organization (See appendix A and B), most of the world's population live in countries where the prevalence of hepatitis B surface antigen (HBsAg) in the general population is high (≥8%) or intermediate (2−7%). The prevalence of hepatitis B virus remains low in certain areas of North America, northern and western Europe, the southern Cone of South America, Australia and New Zealand (WHO, 2018). The CDC also supports the WHO's data, which found that about 45% of the world's population live in areas of high hepatitis B endemicity where the prevalence is ≥8% and a lifetime risk of acquiring it is >60%. Another 43% live in areas of intermediate endemicity with a prevalence of 2-7% where the lifetime risk of acquiring it is 20-60%, and only about 12% of the world's population live in areas of low endemicity where the prevalence is <2% with a lifetime risk of <20% (CDC, 2014).

Screening for Chronic Hepatitis B

The most commonly used test for diagnosing acute hepatitis B or detecting carriers is a blood test, HBsAg. It is the serologic hallmark of hepatitis B virus infection (Lok, 2018). The presence of HBsAg indicates either an acute or chronic infection (CDC, 2018). In order to screen for chronic hepatitis B in asymptomatic individuals, hepatitis B surface antigen (HBsAg) and hepatitis B surface antibody (Anti-HBs) are recommended (Lok, 2018). While HBsAg indicates

acute or chronic infection, Anti-HBs is a protective antibody that indicates recovery and immunity against infection (CDC, 2018). For the purposes of this DNP project, only the HBsAg blood test will be used instead of the USPSTF recommendation of using HBsAg, hepatitis B surface antibody (Anti-HBs) and Hepatitis B core antigen (Anti-HBc); and this is largely due to lack of funding from the clinic. The Hepatitis B core antigen (Anti-HBc) will help distinguish between infection versus immunity, as it only appears after HBV infection and not as a result of HBV vaccination. Whereas, individuals who have received HBV vaccination have only anti-HBs (USPSTF, 2014). Testing for HBsAg will target individuals who test positive whereas testing for Anti-HBs will target individuals who are either immune or susceptible and vaccinate the latter. Recommendations for future studies will be to test for HBsAg, Anti-HBs and Anti-HBc so as to vaccinate susceptible individuals to further prevent transmission.

Eligibility Criteria for HBV Screening

The CDC has the following recommendations of persons or groups eligible for screening for chronic hepatitis B virus. This includes:

> persons born in geographic regions with HBsAg prevalence of ≥2%, US born persons not vaccinated as infants whose parents were born in geographic regions with HBsAg prevalence of ≥8%, injection-drug users, men who have sex with men, persons with elevated ALT/AST of unknown etiology, persons with selected medical conditions who require immunosuppressive therapy, pregnant women, infants born to HBsAg-positive mothers, household contacts and sex partners of HBV-infected persons, persons who are the source of blood or body fluids resulting exposures that might warrant post exposure prophylaxis (e.g., needle stick injury to a health care worker) and persons infected with HIV (CDC, 2008).

Clinic Setting

The Order of Malta Clinic in Oakland opened its doors in 2008. It is a nonprofit safety-net primary care clinic that provides free medical care to the uninsured and low-income patients. It is one of the medical service arms of the Sovereign Order of Malta, Western Association, U.S.A. The clinic has about 25 volunteer physicians and nurse practitioners, and 35 volunteer nurses. They offer an array of medical services and specialties including internal medicine, cardiology, neurology, rheumatology, hematology/oncology, otolaryngology, urology, gynecology, gastroenterology, podiatry and dermatology (Order of Malta Clinic, 2018). As a result of the healthcare crisis in the United States, free clinics such as Order of Malta are highly desired by patients and the communities they serve. A recent study that surveyed over 360 clinics nationwide found that there is an increase demand and need for free and charitable clinics, without which, the uninsured population will not have access to preventive medicine (Birs et. al, 2016). This clinic sees a huge number of immigrants mostly from Asia and Africa where the burden of chronic HBV is endemic. As a safety-net clinic enriched in ethnic minorities, it provides a great opportunity for screening for chronic hepatitis B virus.

Study Goal

Currently, at the Order of Malta clinic, patients eligible for chronic hepatitis B are not always screened following the CDC recommendations, instead, this clinic screens symptomatic patients. Hence, many patients eligible for screening are being missed, and since chronic HBV is usually asymptomatic, persons with chronic HBV can still transmit the disease to others unknowingly thereby posing additional threats to the general public. Therefore, the goal of this project is to improve chronic hepatitis B screening by addressing the gap between current and optimal screening. By so doing, more patients will be screened and those with a positive HBsAg

will be treated in order to prevent or delay cirrhosis and hepatocellular carcinoma. Richmond, Sasadeusz, & Temple-Smith state that if chronic hepatitis B is diagnosed early and managed appropriately, that the risk of liver disease and hepatocellular carcinoma will be greatly reduced (2018). For the purposes of this project, we will be screening for chronic HBV using only the HBsAg test. In Appendix C, some explanations of different types of tests and their interpretations are provided, but we are only focusing on the HBsAg test due to funding limitations.

Population, Intervention, Comparison, Outcome and Time (PICOT)

A survey of 277 providers in different healthcare settings organized by the San Francisco Health Improvement Partnership and Hepatitis B Free Campaign found that HBV screening remains suboptimal. This was largely attributed to several gaps in providers' knowledge of screening guidelines, moreover, a third of the providers were unaware that HBV therapy reduces the risk for the progression of liver disease (Mukhtar et. al. 2017). Hence, the need to educate providers as a means to increase knowledge and awareness of hepatitis B, with an expected outcome of improving HBV screening rates. The PICOT question for this project therefore is: does provider education/training improve chronic hepatitis B screening compared with no education within a six months period?

Description of Search Process

In an effort to answer the PICOT question, the following databases were searched: Cochrane, CINAHL, PUBMED, DynaMed, and PsychINFO using the keywords *hepatitis*, *hepatitis b, hepatitis b virus, chronic hepatitis b, hepatitis b screening, chronic hepatitis b virus infection,* and *hepatitis b prevention.* Cochrane database was limited to full text and English language, it yielded a total of 110 articles. CINAHL database yielded 365 articles but when

limited to English language and year of publication, 260 articles were identified. DynaMed yielded 10 articles, and PsychINFO yielded 52 articles. Articles were screened based on their titles and/or abstracts and the ones that were selected addressed hepatitis b screening, chronic hepatitis B virus or infection.

Available Knowledge

Barriers to HBV Screening

Two research studies that surveyed 404 Asian-Americans found that barriers to HBV screening can occur at different levels which include patient, provider, and resource levels (having insurance and a primary care provider (PCP). Lack of knowledge regarding benefits of screening was a major patient-related barrier and PCPs not discussing and recommending screening tests was found to be a huge physician related-barrier to HBV screening. The authors however, stressed the importance of free screening programs for individuals with no insurance to facilitate the screening process. They explored some reasons why physicians were not recommending HBV screening to patients and found two main reasons: lack of knowledge about HBV and screening guidelines or lack of time. Their recommendation for improving HBV screening was provider continuing education and the use of electronic health records that has the capability of highlighting patients' country of birth in the demographics section. They concluded that screening for HBV is the most important first step in preventing cirrhosis, liver cancer and associated mortality (Cheng, Li & Lok, 2016).

Another study that identified barriers to chronic HBV screening found that up to 70% of chronic HBV carriers were foreign-born immigrants and that about 2 out of every 3 persons infected with HBV were not aware that they were infected. For this singular reason, Abara, Qaseem, Schillie, McMahon, and Harris (2017) stressed the importance of screening for HBV as

a way to decrease chronic HBV health related complications such as cirrhosis and hepatocellular carcinoma thereby decreasing both direct and indirect healthcare costs, estimated at $1 billion. Although screening was found to be a very cost-effective method of reducing healthcare cost and burden, its use still remained low, hence they were of the view that screening for chronic HBV should be a public health priority. They also identified gaps in screening for HBV in high risk populations, including the fact that among foreign born persons, screening was 11-67% which is suboptimal. Despite clinical guidelines from CDC and USPSTF, screening remained low. As part of their findings, there were barriers that explained why guidelines were not followed. They identified multiple barriers such as patient-related, physician related and system related barriers. The authors found that lack of knowledge of chronic HBV, ignorance about screening, language barrier and cultural differences were some of the barriers noted on patient-related levels. Clinicians, however, missed the opportunities to screen due to lack of knowledge about clinical guidelines. Whereas on the system-level barrier, they found that there were very limited hepatitis funded programs for uninsured patients making screening somewhat difficult. In an effort to increase HBV screening, they urged clinicians to screen during clinical encounters and recommended the use of EMR prompts, provider education and standing orders for screening and vaccination (Abarra, et.al, 2017).

A research study of hepatitis B screening behaviors conducted among Chinese and Korean Americans found that even though there is a high prevalence rate of HBV among Chinese and Korean Americans, screening rates remain low at 37% to 55% and 32% to 56%, respectively. Li et.al (2017) investigated further to learn of the barriers associated with low screening of HBV, and found that barriers existed at the individual level, system level, and physician level but the most significant level was the barrier that existed at the physician level.

Based on this, the authors concluded that a physician screening recommendation significantly increased screening rates. Hence, they recommended social marketing (aimed at influencing or changing behaviors) as a way to encourage physicians and healthcare providers to increase their recommendations of HBV screening (Li et.al, 2017).

A study conducted among Vietnamese-Americans (a population considered to be at high risk for hepatitis B because they have a high mortality rates of HBV-related liver cancer) identified barriers that Asian Americans face to HBV screening. These barriers included personal and cultural related reasons, limited access to healthcare, limited English language proficiency and a lack of knowledge on the importance of HBV screening. Ma et. al, (2017), found that adopting a community-based approach would help reduce the stigma associated with chronic HBV and increase screening rates among this group. Community-based research study approach would provide education on HBV and reduce the stigma associated with it. Similar to the findings of other researchers, they also found that patient and provider education would increase HBV screening (Ma et. al. 2017).

Fears of Deportation and Loss of Privacy

Fear of deportation and loss of privacy were also identified as barriers that prevented Africans living in the US from seeking HBV screening. Sriphanlop et. al. (2014), noted that lack of knowledge about HBV and its transmission mode, being asymptomatic and only sought care when ill, complexity of the U.S. medical system, and the stigma associated with HBV in the community were some of the barriers that prevented Africans in the U.S. from screening for HBV. Two unique barriers found among this group that were not found in the Asian-American community included the issues of privacy or fear of disclosure and fear of deportation if undocumented and tested positive for HBV. Participants feared that health professionals may

disclose their HBV status to other community members and family. To increase HBV screening rate in this population, the authors' recommendations therefore were to develop a culturally appropriate intervention to target this group, address the issue of confidentiality and clarify any misconceptions about deportation in the event of a positive result.

A qualitative study on hepatitis B screening among West African Francophone immigrants in New York City was conducted. The authors explored barriers hindering this group from screening for hepatitis B and found that lack of knowledge about HBV screening, the stigma associated with it, cost, religion, attitudes toward health, undocumented status, and fear of deportation as major barriers hindering this group. In an effort to increase HBV screening in this group, they proposed working alongside religious groups and social networks to spread information on hepatitis B screening, and also specifically addressing the issue of deportation or detainment (Blanas et.al. 2015).

Increasing Screening Opportunities

Mitruka et. al (2018) conducted a cross-sectional, retrospective analysis and evaluation of hepatitis B screening among newly arrived refugees at 99 refugee health clinics in 4 states (California, Washington, Minnesota, and Massachusetts). The main aim of their study was to improve screening opportunities. They found that among 32,017 persons with valid test results, 4269 were infected with unknown immune status, 937 were infected, 16,481 were susceptible, and 10,186 were immune, remaining 234 were not categorized. As part of their study, it was found that the prevalence of hepatitis B infection among refugees was about 10 times higher than the U.S. general population. These numbers reinforce the importance of early screening and identification of chronic HBV. Their recommendation was for providers to screen eligible

individuals, treat infected persons and vaccinate susceptible individuals to further prevent transmission.

There was also another study that stressed the importance of chronic hepatitis B screening. The authors were of the view that complications that arise from chronic hepatitis B are costly to manage, hence the importance of screening in order to identify individuals who are infected with the virus and at risk of unknowingly transmitting it to others or developing complications. They went on to opine that treating hepatitis B virus slows its progression to complications such as cirrhosis and liver cancer. Their recommendation was that in order to be cost-effective, providers should screen for chronic hepatitis B virus, and treat those who test positive for the virus (Wright et. al, 2018).

Lack of Trust as Barrier

A group of authors conducted a pilot screening program of hepatitis B screening at an outpatient endoscopy safety-net hospital. They noted that safety-net hospitals are great places to screen for chronic hepatitis B virus given the huge number of immigrants that they serve. They followed the USPSTF recommended guidelines for screening, and their implementation improved HBV screening from 24.5% to 75.6%. Based on their study, several barriers to screening were identifiable, including the fact that many minority groups do not trust their healthcare providers. They also found that most ethnic minorities did not see the need for screening since they were feeling well and asymptomatic. There was also lack of knowledge found on both the patients' side and the providers, the former did not understand the burden of the disease, mode of transmission and prevention while the latter lacked awareness of the proper screening for this population, hence the reasons for low screening. Their recommendation

therefore was that incorporating chronic HBV screening into a safety net clinic would be a great way to improve screening (Campbell, Lopez, Liu, Bhuket, & Wong 2018).

Rationale

Gap Analysis

This DNP student undertook a random retrospective review of 240 charts at the clinic, and physicians were interviewed individually to identify the barriers for screening for chronic HBV. The clinic has noted an increase in the proportion of patients presenting from areas of the world where the endemic rate of HBV is considered "high" by the CDC, warranting a chronic HBV screening test. Review of laboratory billing data did not demonstrate an increase in the rate of HBV screening tests (typically a single blood HBsAg) resulting in concern for under-screening at the clinic. Chart review indicated that a gap in screening exists, the current data so far indicates about 33% adherence to the screening recommendations per CDC (See Appendix F).

Theoretical Framework

The health belief model, and the theory of social marketing was used to implement this project at the Order of Malta Clinic. The health belief model is applicable to the patient population that the Malta clinic serves and this will be discussed below.

The Health Belief Model:

The health belief model was developed in the 1950s by social psychologists Hochbaum, Rosenstock and Kegels at the U.S. Public Health Service in an effort to understand the reasons people fail to respond to disease prevention strategies or screening tests. The authors were of the view that an individual's personal belief in either a threat of an illness or effectiveness of

recommended health behavior would determine if they would adopt that behavior (LaMorte, 2018). There are six concepts of the health belief model: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action and self-efficacy.

Perceived susceptibility: personal belief of the risk or vulnerability of acquiring an illness.

Perceived severity: personal belief on the seriousness of an illness and consequences if left untreated.

Perceived benefits: personal steps available to avoid or cure illness.

Perceived barriers: perceived obstacles to follow recommended health options.

Cue to action: the motivating factor behind accepting a recommended action such as one experiencing chest pain.

Self-efficacy: personal confidence in one's ability to perform a behavior.

Jones et al. (2014) stated that in order for people to change behaviors; barriers, benefits and threats need to be addressed. They went on to summarize the concepts of the health belief model identified above stating "that people will take action to prevent illness if they regard themselves as susceptible to a condition (perceived susceptibility), if they believe it would have potentially serious consequences (perceived severity), if they believe that a particular course of action available to them would reduce the susceptibility or severity or lead to other positive outcomes (perceived benefits), and if they perceive few negative attributes related to the health action (perceived barriers)" (Jones et. al. 2014, p. 569). Based on the literature review, several cultural and personal beliefs that prevented individuals from HBV screening were identified. Hence, by adopting this model, and creating awareness of the dangers of chronic hepatitis B, our patient population might be more willing to adopt it.

The Theory of Social Marketing:

The theory of social marketing was also found to be applicable to our patient population at the clinic. Social marketing helps influence health behavior using a wide range of health communication strategies such as interpersonal communication and message placement at clinics (Evans, 2006). In this study, the author went ahead to state that social marketing uses behavior, and persuasion to target health risk behaviors. He identified six stages of social marketing: plan strategy, selecting communication channels, developing materials, implementation, assessing effectiveness and feedback (Evans, 2006). Placing messages at the clinic aimed at motivating patients to ask their healthcare providers of their eligibility for chronic hepatitis B screening would serve as a social marketing strategy aimed at influencing health behavior.

Specific AIM

By October 2019, about 70% of eligible patients at the Order of Malta Clinic will be screened for chronic hepatitis B virus using the HBsAg blood test. Education was provided to physicians and nurse practitioners as a reminder on the CDC eligibility criteria for screening. Healthcare providers were interviewed individually to gain insights to the barriers of screening for chronic HBV. There was a random review of 240 patients' charts, pre-intervention education was provided and charts were once again reviewed post-intervention to determine the outcome and success rate.

Section III. Methods

Context

Random retrospective review of 240 charts was undertaken to get a sense of how many eligible patients were screened prior to the intervention, this represents about 20-25% of the clinic's population. A pre-and post-intervention was done to determine the impact of this project

at the clinic. Guidelines from the CDC, the WHO and existing literature have revealed that chronic hepatitis B screening among immigrants is low and this was also an issue that was noted at the clinic. Several meetings were held with the medical director of the clinic and some key stakeholders. The medium of these meetings included emails, phone calls, and face-face meetings. An agreement was reached to carry on with the project with the hopes that it will be beneficial to patients and providers. On the one hand, more patients will be screened for chronic hepatitis B, and if positive, treatment will be started to prevent or delay end organ damage and also minimize transmissions. On the other hand, providers' knowledge on screening guidelines will improve and thus, they will be more willing and comfortable to recommend chronic hepatitis B screening to eligible patients.

Intervention

Needs Assessment: A series of interviews with clinic providers on a one-on-one basis was conducted. This approach was considered over focus groups to ensure that a wide array of responses could be collected (i.e., Avoiding a group dynamic where an individual's responses may be overshadowed by another individual's presence/contribution). Developing this instrument was informed by Michie et al's, twelve domains to consider in designing interventions to achieve improved implementation (Michie et.. al.,2004). Michie et al's process was, at least partially, based on Becker's Health Belief Model focusing on an aspect of motivation (e.g., If a person is highly motivated to an action, they will perform the action) and Ajzen's Theory of Planned Behavior whereby beliefs affect intention which plays a major role in carrying out an action (Becker, 1974, Ajzen, 1971).

Potential interview questions that were administered to clinic providers were identified, vital questions were selected following Fishbein et al's suggestion that three domains are

necessary and sufficient for the engagement of a target behavior: intention, lack of environmental constraints, and the actual skill needed to perform the behavior. The Com-B framework was used to identify barriers and enablers related to the capability, opportunity, and motivational aspects of HBV screening (Fishbein et al. 1975). While the interview guide is essential to investigating the implementation of chronic HBV screening practices, the aim was to further apply the information gathered toward an intervention to increase HBV screening rates. To that end, interview questions related to social influences were included, and using the COM-B framework, social influences from clinic opinion leaders were identified as a major potential enabler of behavior in the Malta clinic environment (Michie et.al, 2004).

Contextually, 2 clinic opinion leaders that have provided service at the clinic for the longest time were identified. They were available on the most days (4 out of 5 days that the clinic is open) and were often sought after for their opinion on patient management both clinically and logistically/administratively. The process of instrument development is conceptually diagramed in Appendix K. An interview guide is presented with the construct and domains targeted by each question and its associated opportunity for change. This tool allows for specific answers to be elicited following the table-based format with a summary table denoting the provider, overall themes that arise from the interview, and representative quote(s) following the example in appendix L.

Educational Intervention: A 30-minute poster presentation was provided to physicians, nurse practitioners and staff at the clinic. This was done over a course of 3-4 weeks at different times in order to reach multiple providers. This presentation covered the importance of screening for chronic HBV, the eligibility criteria and what test to order. Also, healthcare providers were

provided with a laminated copy of eligibility criteria/screening tool and list of countries of birth to screen for, as a quick reference guide (see appendix B).

Written Protocol: There was also a written protocol for chronic HBV screening at the Order of Malta clinic. This written protocol included the screening tool and the test to order for the screening which in this regard was the HBsAg test.

Policy for Referral: The clinic is willing to treat eligible patients with a positive HBsAg test, hence, no further referral will be needed at this time. Patients will only be referred for further treatment if there is an indication of end organ damage or other complications which the clinic would not be able to manage due to limited funding and resources.

Follow-up: All follow-up will occur at the clinic unless complications arise, which is not anticipated at this time.

Patient Education: There were visual messages posted in the waiting area at the clinic and in every examination room on chronic hepatitis B, its risks, and benefits of screening to avoid long term sequelae. This message was targeted to patients to encourage them to ask their providers about chronic hepatitis B screening.

Study of the Intervention

The purpose of this project was to improve chronic hepatitis B screening at the Order of Malta clinic in Oakland, California. The clinic would follow CDC recommendations to screen eligible patients at the clinic, which for the most part accounts for about 90% of the patients' population. Eligible patients would be screened regardless of age, gender and family history.

Outcomes Measurement

Outcomes were measured based on the following:

1. The number or percentage of patients screened before and after the intervention.

2. Increase in screening eligible patients from baseline of roughly 33% to about 70% by October 2019.
3. Increase in providers' knowledge of CDC guidelines of chronic hepatitis B screening.

GANTT Chart

The timeline for this project was from December 2018 to December 2019 (see Appendix G). The GANTT chart provided a visual image of when the project was initiated, the different stages through the final stage. It also provided an illustration of the clinical coursework that were completed alongside the completion of this project. The GANTT chart was used to ensure that this project stayed on track since there are timeframe/timeline for each milestone. The initial plan for this project was to focus on hepatitis B screening, diagnosis and treatment but after meeting with the clinic leadership, an agreement was reached to focus only on the screening of chronic hepatitis B which is what the clinic needs at this time.

Strengths, Weakness, Opportunities, and Threats (SWOT)

A SWOT analysis helped in identifying the strengths, weaknesses, opportunities and both internal and external threats facing this project. One of the strengths of this project will be cost saving in the long run because the cost of screening for hepatitis B is far more beneficial than the cost of treating it. It also provided training opportunities for physicians and nurse practitioners at the clinic to stay abreast of current CDC recommendations of chronic hepatitis B. This ensured that providers remained consistent in screening eligible patients for chronic hepatitis B. One weakness that this project faced was time constraints in trying to provide the different sessions of the training to providers. There were several opportunities that came with this project. Chronic hepatitis B screening was improved (although not to the desired goal), thereby enhancing outcomes. Providers' knowledge on screening guidelines was also improved, communication

between providers and patients also improved. One major threat faced in the conduct of this project was compliance on the part of the providers since change is somewhat difficult to adopt. A constant reminder was needed in order to ensure that the providers did not fall back to the status quo. Sustainability was another threat faced in the completion of this project because most of the providers at the clinic are on a volunteer basis. The question here becomes who continues to ensure that the CDC guidelines for hepatitis B screening continues to be followed. (See Appendix J).

Work Breakdown Structure

This project was divided into five different parts (see appendix H). The first part identified the problems or issues that were addressed. In this case, the first issue was inadequate screening for chronic hepatitis B and finding ways to improve this screening at the clinic. The second step involved the identification of key stakeholders. For the purpose of this project, the stakeholders were physicians, nurse practitioners, patients, nurses and clinic leadership. The third phase was the planning phase. During the planning phase, training schedules were mapped out, providers were trained/educated over a 3-4 weeks span on CDC guidelines and recommendations. There was also a one on one interview of providers to identify barriers to hepatitis B screening. The fourth stage was the implementation phase. This step was undertaken over a 2-3 months period in order to provide ample time for providers to incorporate the screening into their practice and routine. The final phase of this project was the evaluation phase. The purpose of this stage was to determine whether or not there were positive or negative outcomes.

Financial Plan

The financial portion of this project is presented below:

- Retrospective review of 240 patients' charts for 30 hours, this writer's hourly income estimated at $60 per hour.
- Average time to order hepatitis B screening by physicians and nurse practitioners was estimated at 15 minutes, hourly pay estimated at $90. Therefore, they spent $22.50 of their hourly income ordering hepatitis B screening test.
- Each hepatitis B surface antigen test (HBsAg) costs $14.20.
- Weekly review of charts post-intervention of another 240 charts to evaluate the outcome/impact of the project was estimated to be 30 hours.
- Expense of paper, supplies, ink, lamination and poster was approximately $250.

Profit and Loss

The breakdown of loss associated with this project is provided below:

- The writer's time in data collection, meetings, and training clinic staff:
    - $60/hour x 60 hours for pre-and post-chart review = $3,600
- Hourly pay for medical staff at the clinic to assist:
    - $20/hour x 20 hours = $400
    - Cost of paper, lamination, ink, poster and other supplies = $250

Assumed Cost Savings/Avoidance

A key recommendation is to screen eligible patients using the hepatitis B surface antigen (HBsAg)

- The cost of one HBsAg test was $14.20, and the average time to order one test was 15 minutes which resulted in about $22.50 of the providers' hourly salary.
    - 58 HBsAg tests were ordered, 58 x $14.20 = $823.60
    - Providers' time = $22.50 x 58 = $1,305

Although the economic impact of treating hepatitis B related complications has not been well studied, an estimate of its annual cost is listed below: (see Appendix Q for more information).

- The average cost of treating one case of chronic hepatitis B is estimated at $761, compensated cirrhosis is $227, decompensated cirrhosis is $11,459, liver transplant is $86,552, transplant care >12 months following transplant is $12,560, and hepatocellular carcinoma is $7,533 (Lee, Veenstra, Iloeje, & Sullivan, 2004).

Communication Matrix

As part of this project, stakeholders were identified which include but not limited to physicians, nurse practitioners, registered nurses, patients, clinic administrator and office staff. There were several back and forth communication involving this writer and the clinic administrators, staff, physicians, nurse practitioners, academic supervisor and the second academic supervisor. Communication took place on an as needed basis via emails, phone calls, zoom, text messages and face to face meetings. After multiple communication, an area of interest was identified, and a timeline was developed. The project kicked off after getting an approval from the agency (see Appendix M). Multiple educational/training sessions on CDC's guidelines were presented to providers, clinic administrator and clinic staff (See Appendix P). Laminated copies of screening tools (see Appendix O) were provided to healthcare providers, and were also posted in every patient's room and nursing station for easy reference.

Analysis

Microsoft Excel was used to analyze data collected during this project. Charts and tables were also utilized to provide clarification on the findings on the data analyzed in this project. Percentages were used to demonstrate clear and concise results obtained from data collection.

Ethical Considerations

Some ethical concerns were addressed during the course of this project. Screening for chronic hepatitis B followed the recommended guidelines as stipulated by the Centers for Disease Control and Prevention. From a clinical standpoint, clinicians at the clinic did not always screen for chronic hepatitis B based on the recommendations, individual choices were made to offer screening if patient had other risk factors. This might have had to do with the fact that USPSTF rated HBV screening as grade B, indicating that it is recommended to screen only in high risk individuals. (See Appendix N). For this reason, clinicians often used their personal judgment to determine which individuals need screening. This, however poses a clinical ethical concern and in order to address this, clinicians are encouraged to follow the hepatitis B screening guidelines to screen patients at high risk for chronic hepatitis B. The different grading scale communicates the importance of a recommended screening to providers (USPSTF, 2018). The United States Preventive Services Task Force (USPSTF) recommends HBV screening in persons at high risk. This recommendation is in line with the American Association for the Study of Liver Diseases (AASLD) and the Center for Disease Control and Prevention (CDC) guidelines (Mukhtar et.al. 2017).

Another ethical concern that usually arise with a project of this kind is the issue of privacy but in this case, it was not a concerning factor because patients' identifiers such as names, date of birth, and medical record numbers were not used. Country of origin or regions were used as a major identifier for screening high risk patients.

Jesuit Values and ANA Ethical Standards Ethical Considerations

Hepatitis B screening offered by clinicians would improve patients' health in the long run because patients exhibiting positive hepatitis B would be treated and this will avert long term

damage of hepatitis B. This relates to the American Nurses Association's ethical standard that states that "the nurse promotes, advocates for, and protects the rights, health, and safety of the patient." (ANA, 2015). This is also in line with the Jesuit values of *cura personalis* which means care for the whole person. *Cura personalis* recognizes an individual as a whole, the body, heart and soul and promotes the dignity of every person (Otto, 2009). Following the CDC's guidelines to screen for chronic hepatitis B would ensure that patients who are eligible for screening are taken care of, thereby promoting their individual dignity and caring for the whole person.

Section IV. Results

Pre-Intervention Results

A random retrospective review of 240 patients' charts was undertaken prior to the intervention, 92 patients were eligible for chronic hepatitis B virus screening, 40 patients were not eligible and 108 patients had unknown eligibility status. The reason for this high number of unknown eligibility status was due to inadequate information obtained from patients' charts. Out of the 92 patients that were eligible, only 30 patients were screened and this represented approximately 33% of the patients.

Post-Intervention Results

A post-intervention review of charts was done on a weekly basis to evaluate the effect of the intervention. Charts of patients who were seen the previous week were reviewed, data collected and analyzed. Charts were reviewed over 10 weeks and analysis of this data did not show a significant increase in the screening rate. Another 240 patients' charts were reviewed, 112 patients were found to be eligible for chronic hepatitis B virus screening, 32 patients were not eligible and 96 patients had unknown eligibility status. 58 out of 112 eligible patients were screened and this was approximately 52% of eligible patients. This represented a 19% increase

from baseline of 33%. Although this project had aimed at improving the screening rate to about 70%, only a 52% increase was noted and this was largely due to certain limitations that will be discussed in the limitation section.

Follow up Post-Intervention

Extra efforts were made to ensure the success of this project. When it was noted that the screening was not occurring at the expected rate, some of the nurse volunteers were trained one-to-one on the screening tool on how to determine patients' eligibility status based on chart review. The nurse volunteers were encouraged to pull charts of patients who were to be seen the following day and tagged them for the provider that would be seeing the patient. This extra step was meant to serve as a reminder for providers to remember to screen eligible patients based on their eligibility status. This extra effort was not very welcoming as the nurse volunteers already had so much to accomplish in a given day. Hence, it did not make any significant contribution to the results of this project.

Section V. Discussion

Summary

The aim of this project was to improve hepatitis B screening rate from baseline of about 33% to about 70% but this aim was not quite achieved, instead the screening rate was only improved to about 52% which represented a 19% increase. The reason for this minimal level of achievement on the goal of this project, for the most part may have to do with the uniqueness of the clinic. The clinic is managed mostly by volunteers, as a result, it was hard to reach all volunteers. There were some volunteers who only showed up on a monthly basis and others on a weekly basis. Since it was basically a free clinic, the volunteers were not required to follow any particular guidelines, hence, individuals chose whether or not to follow the screening

recommendations for this project. There was also a lot of resistance from providers who questioned the reason for changing practice especially since more screening would mean more money to be spent on testing for HBsAg.

Interpretation

There were some in-service trainings provided to both physicians and nurse practitioners at the clinic in order to expose them to the latest update on chronic hepatitis B screening. One way to understand the worth of this project was to consider the benefits that early screening provided to patients. Patients who were screened were satisfied knowing their hepatitis B status. Early screening would be cost beneficial in the long run because it will save the cost of treating the sequelae of chronic hepatitis B. This would improve both patients' and physicians' satisfaction, and overall quality of life as there will be reduction in mortality and morbidity.

Limitations

Several limitations were identified during the course of this project. This project took place at a free clinic, as a result, a lot of the patients seen at the clinic had not seen a provider in so many years, whereas some of these patients had co-morbid and chronic conditions that required more attention. Hence, chronic hepatitis B screening did not always become a top priority as a standard of care unless patients had symptoms. Owing to the uniqueness of this clinic, the findings might not be applicable to other clinics that were structured differently. Although there was an extra effort made to improve the screening rate as discussed earlier, this still did not help improve the screening rate because of the uniqueness of this clinic. For instance, this clinic utilized paper charts, there was no electronic health record making it difficult to flag a patient's record as eligible for chronic hepatitis B screening.

The sample size was also considered as a limitation. A review of 240 charts might not have been enough to generalize and to conclude that chronic hepatitis B screening had not been offered to eligible patients. The recommendation would be for future studies to target a larger audience in order to apply the results to other larger organizations.

Another limitation was the fact that only the HBsAg test was used, instead of the HBsAg, Anti-HBc and Anti-HBs. As a result, there would be missed opportunities to vaccinate susceptible individuals against HBV.

Conclusions

Chronic hepatitis B virus remains a global epidemic where some regions of the world are affected more than others. Even though the United States is not among the highly endemic regions of hepatitis B, it is imperative to note that owing to the huge number of immigrants in the States from endemic nations/countries, that approximately 700,000 to 2.2 million persons have chronic hepatitis B virus (USPSTF, 2014). Since patients with chronic hepatitis B might not always present with symptoms and will probably transmit the disease unknowingly, screening therefore is highly recommended in high risk individuals as a way to decrease mortality and the many sequelae of the virus such as cirrhosis and hepatocellular carcinoma. The Order of Malta clinic sees a huge number of immigrants (about 90% of their patient population), hence, incorporating chronic hepatitis B screening as part of routine care for eligible patients is highly encouraged. The screening will help to identify chronic carriers of hepatitis B virus, including offering them treatment to decrease or prevent the long-term sequelae of the virus.

Section VI. Other Information

Funding/Cost

Each HbsAg test costs $14.20 and the clinic leadership covered the cost of this test for eligible patients at the clinic who met the screening criteria. No other outside sources supported this project.

Section VII. References

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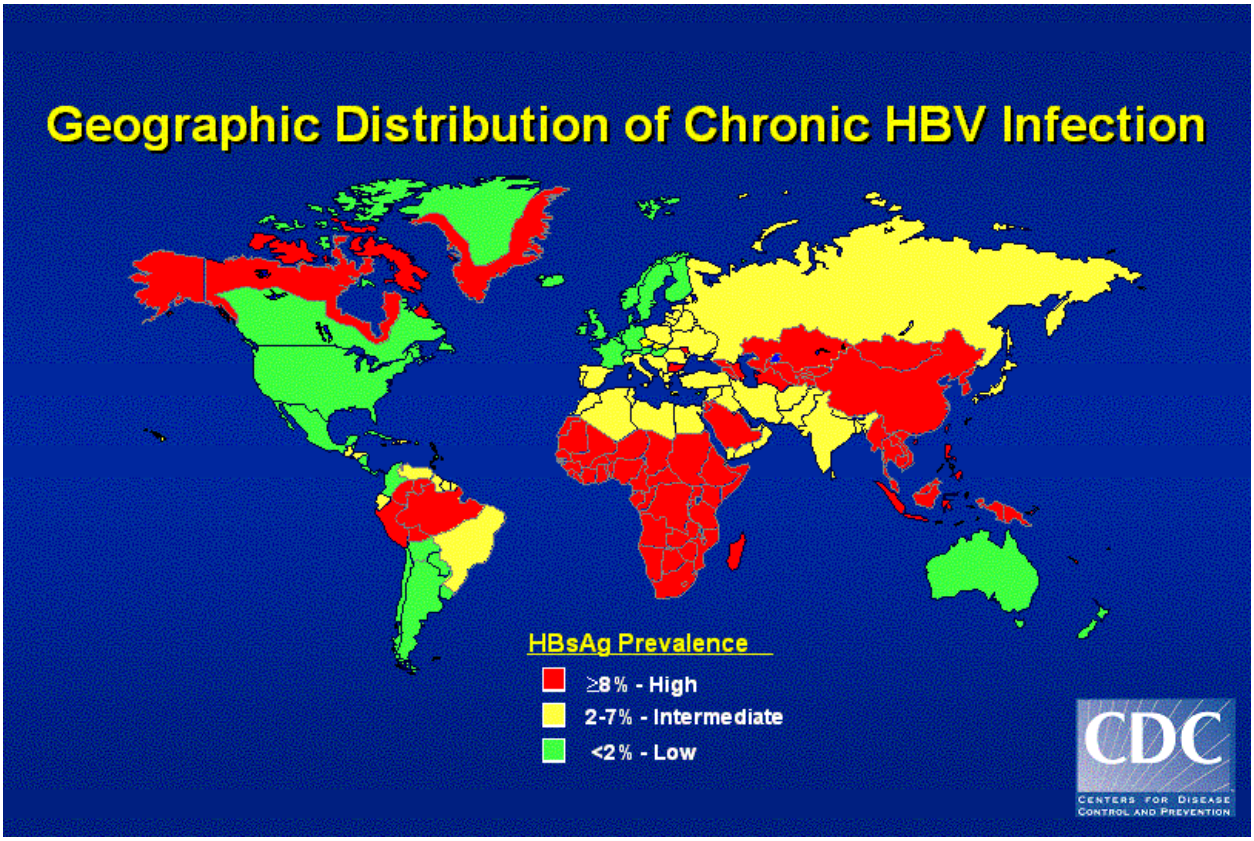
Section VIII: Appendices

Appendix A

Geographic Distribution of Chronic HBV Infection



Appendix B

Geographic Regions with a Prevalence of Hepatitis B Surface Antigen >2% (USPSTF)

Region	**Countries**
Africa	All
Asia	All
Australia and South Pacific	All except Australia and New Zealand
Middle East	All except Cyprus and Israel
Eastern Europe	Malta, Spain, and indigenous populations in Greenland
North America	Alaska natives and indigenous populations in northern Canada
Mexico and Central America	Guatemala and Honduras
South America	Ecuador, Guyana, Suriname, Venezuela, and Amazonian areas of Bolivia, Brazil, Colombia, and Peru
Caribbean	Antigua and Barbuda, Dominica, Grenada, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, and Turks and Caicos Islands

Appendix C

Hepatitis B Serologic Marker Interpretation (CDC 2014)

HbsAg (Hepatitis B surface antigen)	**Total anti-HBc (Antibody to hepatitis B core antigen)**	**IgM anti-HBc (Immunoglobulin M to anti-HBc)**	**Anti-HBs (Antibody to HbsAg)**	**Interpretation**
-	-	-	-	Never infected and susceptible to infection
+	+	-	-	Chronic infection
-	+	-	+	Recovered from past infection and immune
+	+	+	-	Acute infection
-	+	-	+	Immune by natural infection
-	-	-	+	Immune by hepatitis B vaccination
-	+	-	-	Immune by natural infection or possible false positive

Appendix D

DNP Statement of Non-Research Determination Form

Title of Project:

Improving Chronic Hepatitis B Virus Screening at a Safety-Net Primary Care Clinic

Brief Description of Project:

Currently, at the Order of Malta clinic, patients eligible for chronic hepatitis B are not always screened following the CDC recommendations; this clinic screens symptomatic patients. Hence, a lot of patients eligible for screening are being missed, and since chronic HBV is usually asymptomatic, persons with chronic HBV can still transmit the disease to others unknowingly thereby posing additional threat to the general public. Therefore, the goal of this project is to improve chronic hepatitis B screening thereby addressing the gap between current and optimal screening. By so doing, more patients will be screened and those with a positive HBsAg will be treated in order to prevent or delay cirrhosis and hepatocellular carcinoma. Richmond, Sasadeusz, & Temple-Smith state that if chronic hepatitis B is diagnosed early and managed appropriately, that the risk of liver disease and hepatocellular carcinoma will be greatly reduced (2018). For the purposes of this project, we will be screening for chronic HBV using only the HBsAg blood test.

D) Aim Statement:

By October 2019, about 70% of eligible patients at the Order of Malta Clinic will be screened for chronic hepatitis B virus using the HbsAg blood test. Education was provided to physicians and nurse practitioners as a reminder on the CDC eligibility

criteria for screening. Healthcare providers were interviewed individually to gain insights to the barriers of screening for chronic HBV. 240 patients' charts were randomly reviewed; pre-intervention education was provided and charts were once again reviewed post-intervention to determine the outcome and success rate.

B) Description of Intervention:

A 30 minutes poster presentation was provided to physicians, nurse practitioners and staff at the clinic. This was done over a course of 3-4 weeks at different times in order to reach multiple providers. This presentation covered the importance of screening for chronic HBV, the eligibility criteria and what test to order. Also, healthcare providers were provided with a laminated copy of eligibility criteria/screening tool and list of countries of birth to screen for, as a quick reference guide (see appendix B).

C) How will this intervention change practice?

It will provide consistency among providers. By following the recommended screening guidelines of chronic hepatitis B virus, patients who are positive will be treated to avert or prevent the long-term complications of the virus and also prevent transmission to unaffected individuals. This will reduce health care cost in the long run and improve overall quality of life.

D) Outcome measurements:

Outcomes were measured based on the following:

1. The number or percentage of patients screened before and after the intervention.
2. Increase in screening eligible patients from baseline of roughly 33% to about 70% by October 2019.

3. Increase in providers' knowledge of CDC guidelines of chronic hepatitis B screening.

References:

Richmond, J. A., Sasadeusz, J., & Temple-Smith, M. (2017). The Role of Primary Health Care in Hepatitis B Testing and Management: A Case Study. *Journal of community health*, *43*(1), 38-47.
Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5767201/

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: (http://answers.hhs.gov/ohrp/categories/1569)

☐ **X** This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

☐ This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

Instructions: Answer YES or NO to each of the following statements:

Project Title: Improving Chronic Hepatitis B Virus Screening at a Safety-Net Primary Care Clinic	**YES**	**NO**
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	**X**	
The specific aim is to improve performance on a specific service or program and **is a part of usual care**. ALL participants will receive standard of care.	**X**	
The project is **NOT** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **NOT** follow a protocol that overrides clinical decision-making.	**X**	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	**X**	

The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	**X**	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	**X**	
The project has **NO** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	**X**	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	**X**	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."*	**X**	

ANSWER KEY: If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

STUDENT NAME (Please print): Uwaezu Joy Umeh

Signature of Student:

_____DATE_____

SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):
Dr. Jo Loomis_____
Signature of Supervising Faculty Member (Chair):

_____DATE_____

Appendix E

Evaluation Table

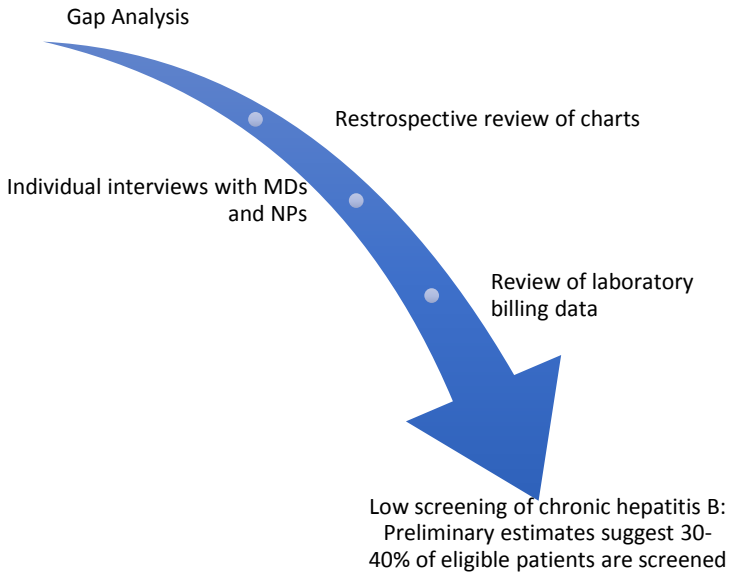
Citation: Author(s), Date of publication & Title	**Design/Method**	**Study Findings**	**Appraisal**
Cheng, S., Li, E., & Lok, A. S. (2016). Predictors and Barriers to Hepatitis B Screening in a Midwest Surburban Asian Population.	Survey studies of 404 participants	Screening for HBV is the most important first step in preventing cirrhosis, liver cancer and mortality.	Level IIIA
Abara WE, Qaseem A, Schillie S, McMahon BJ, Harris A.M. (2017). Hepatitis B Vaccination, Screening, and Linkage to Care: Best Practice Advice From the American College of Physicians and the Centers for Disease Control and Prevention.	Systematic reviews, meta-analyses, and randomized and nonrandomized intervention studies from the research literature.	Screening in high-risk populations is the first step in identifying persons with chronic HBV infection, thereby reducing the burden and cost associated with HBV infection.	Level IIIA
Li, S., Sim, S-C., Lee, L., Pollack, H.J., Wyatt, L.C., Trinh-Shevrin, C., Pong, P., & Kwon, S.C. (2017). Hepatitis B Screening and Vaccination Behaviors in a Community-Based Sample and Chinese and Korean Americans in New York City	Survey study, cross sectional design study	HBV screening rates are low among Chinese and Korean Americans but physician's screening recommendation significantly increased screening rates.	Level IIIA
Ma, G.X., Fang, C.Y., Seals, B., Feng, Z., Tan, Y., Siu, P., Yeh, M. C., Golub, S.A.,	Cluster community-based randomized trial	There is a high prevalence of hepatitis b among Vietnamese Americans yet screening remained low and this could be attributed to lack of knowledge of HBV, personal	Level IA

Nguyen, M.T., Tran, T., Wang, M. (2017). A Community-Based Randomized Trial of Hepatitis B Screening Among High-Risk Vietnamese Americans		and cultural reasons but a community-based approach to screening, patient and provider education would help increase screening.	
Sriphanlop, P., Jandorf, L., Kairouz, C., Thelemaque, L., Shankar, H., & Perumalswami, P. (2014). Factors Related to Hepatitis B Screening among Africans in New York City	Qualitative study	Lack of knowledge of HBV and transmission mode, privacy, fear of disclosure and deportation if positive for HBV on screening were found to be some of the barriers preventing Africans in the U.S. from screening for HBV.	Level IIIA
Blanas, D., Nichols, K., Bekele, M., Shankar H., Bekele, S., Jandorf, L., Izzeldin, S., Ndiaye, D., Traore, A., Bassam, M., Perumalswami, P. (2015). Adapting the Andersen Model to a Francophone West African Immigrant Population: Hepatitis B Screening and Linkage to Care in New York City	Qualitative study	Religion, attitudes toward health, undocumented status, and fear of deportation were barriers to screening for HBV among West African Francophone immigrants	Level IIIA
Mitruka et al., 2018	Cross-sectional, retrospective analysis	They found that among 32,017 persons with valid test results, 4269 were infected with unknown immune status, 937 were infected, 16,481 were susceptible, and 10,186 were immune, remaining 234 were not categorized. Their study found that the prevalence of hepatitis b infection among refugees was about 10 times higher than the U.S. general population.	Level IIIA
Wright, C.M., Boudarene, L., Ha, N.T., Wu, O.,	A systematic review and literature search	The authors found that screening for chronic hepatitis B is cost-effective, and that treatment	Level IA

Hawkins, N. (2018). A Systematic Review of Hepatitis B Screening Economic Evaluations in Low- and Middle-Income Countries	of databases such as MEDLINE, PubMed, EMBASE, CINAHL, the Cochrane Library, EconLit, and Global Health	reduces hepatitis associated complications	
Campbell, B., Lopez, A., Liu, B., Bhuket, T., & Wong, R.J. (2018). A Pilot Program Integrating Hepatitis B Virus (HBV) Screening into an Outpatient Endoscopy Unit Improves HBV Screening Among an Ethnically Diverse Safety-Net Hospital.	A pilot study, randomized controlled trial	They identified barriers to screening for hepatitis b such as mistrust of providers by minority groups, lack of knowledge of HBV screening. This pilot study showed that HBV screening rates could be improved at safety-net clinics. Their recommendations therefore were that incorporating chronic HBV screening into a safety net clinic would be a great way to improve screening.	Level II B

Appendix F

Gap Analysis



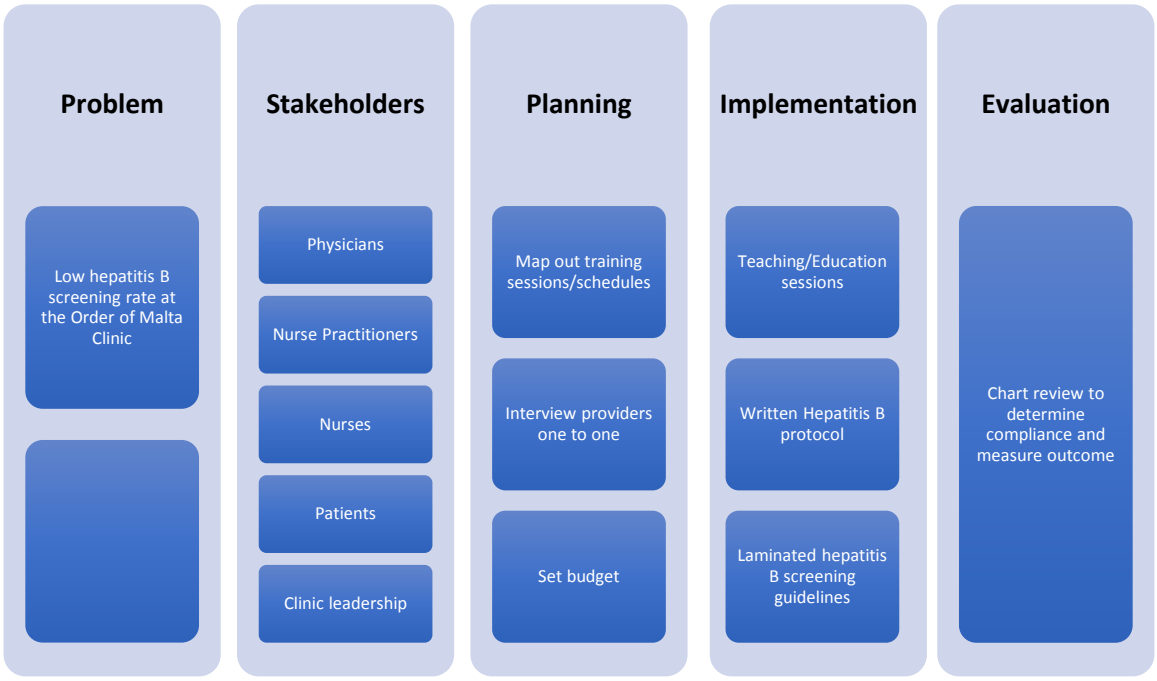
Appendix G

GANTT Chart

GANTT CHART	2018	2019											
Stages of Project and DNP Course Work	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stage I: -Needs Assessment -Protocol Development -Literature Review -Identification of Stakeholders -NURS 7005 Project Management													
Stage II: -Chart Review -Data Collection -NURS 785 Practicum IV -NURS 749B Prospectus Development													
Stage III: -Project Implementation -NURS 763 Financial Management -NURS 789 DNP Project NURS 795 DNP Implementation													
Stage IV: -Project Draft -Final Project Submission													

Appendix H

Work Breakdown Structure



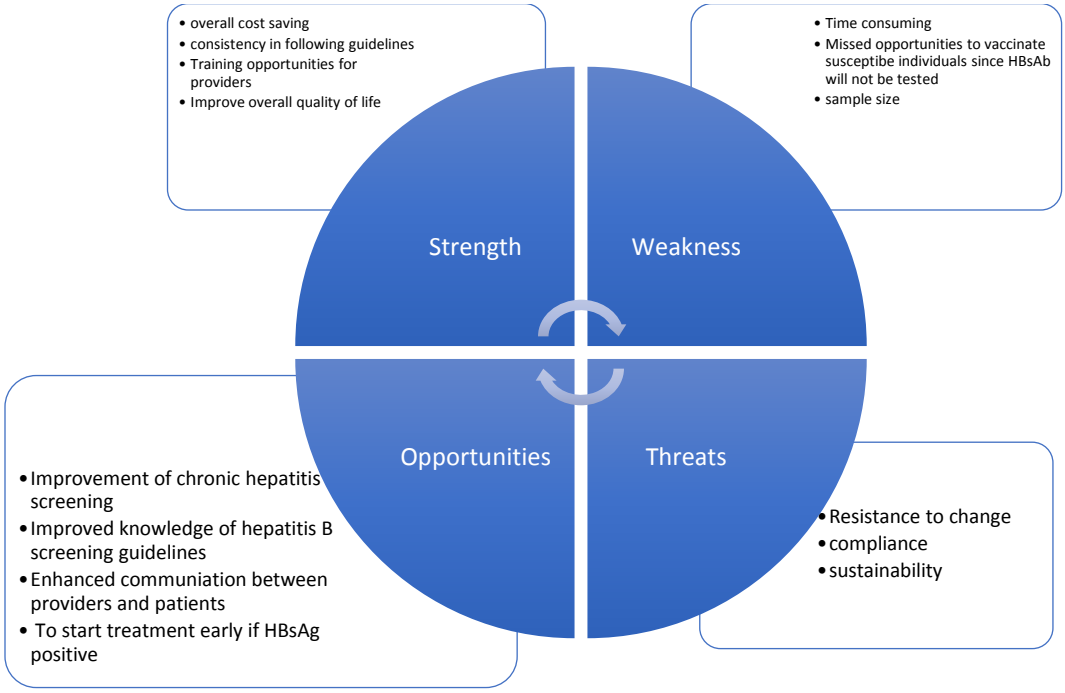
Appendix I

Responsibility/Communication Matrix

What	When	To whom	How
Meeting with academic advisor and committee member, Dr. Loomis and Dr. Rowniak	As needed	Advisor	Email, zoom sessions
Meeting with Clinic supervisors, administrator, and Director to discuss the project, staffing, and schedules	Monthly and as needed	Clinic supervisors, clinic director	Email, face-to-face meeting, text message
Chart review with volunteer staff	As needed	Volunteer staff	Face-to-face

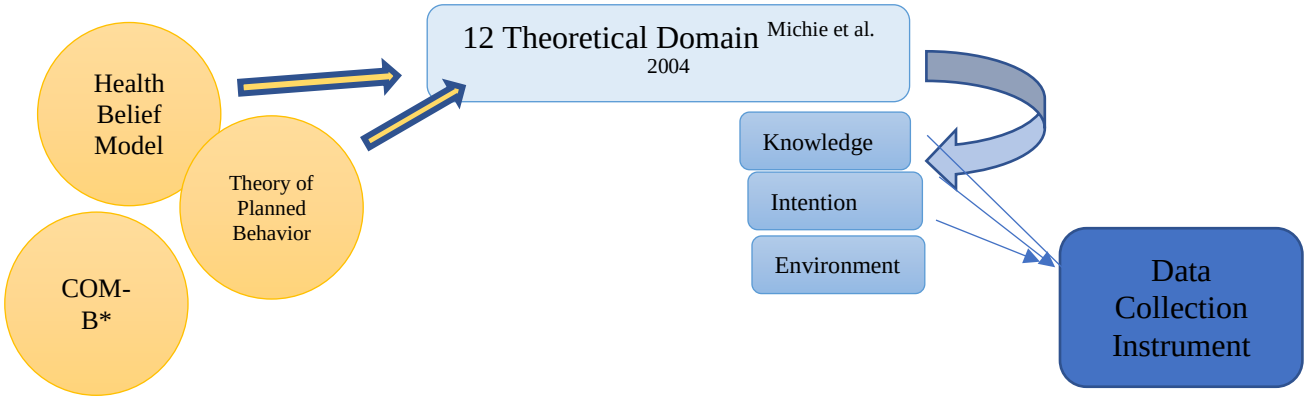
Appendix J

SWOT Analysis



Appendix K

Data Collection Instrument



Appendix L

CQI Method/Data Collection Tool

Interview Question by Domain (Fishbein et al. 1991)	Construct (Michie et al. 2005)	Summary of Mock Data
Knowledge: How familiar are you with HBV screening eligibility requirements? Do you know what tests to order for someone who is eligible? What is the rate of screening done at the clinic? (in terms of test per eligible patient) What is the rate of chronic HBV infection identified at the clinic? Do you typically know the prevalence of HBV infection in your patients' home countries? (including the Bay Area/United States) How do you think HBV screening can be important to patients and to our clinic/local community/beyond?	- Knowledge: provider/intake nurse screening eligibility knowledge following clinic guidelines - Knowledge about scientific rationale: provider/intake nurse understanding of HBV prevalence, transmission, and potential for chronic infection; knowledge regarding chronic HBV potential complications; knowledge of decrease risk from HBV vaccination - Schemas + mindsets + illness representations: HBV infection representation (wide array), clinic population diversity (eg. last month 40% of patients presented from a country of origin in sub-Saharan Africa, where the prevalence of HBV is considered "high" by the CDC, warranting HBV screening) - Procedural Knowledge: screening process knowledge (how to order, which form to order, which test to order (HbsAg - blood), reporting of test results from lab to clinic	*"I'm vaguely familiar insofar as knowing whether the majority of my patients are eligible/ineligible."* "*I know the HBsAg is the usual test, but I'm not sure when the other blood tests should be used"* *"I have no idea about the rate of the clinic's screening, but I know I probably under-screen"* *"I know the HBV prevalence is high in Eritrea, but otherwise I'm not completely sure"* *"HBV screening is likely vital for our foreign patients who are visiting the country temporarily. I'm unsure of the local impact"*
Intention: Do you feel that you need to assess HBV screening eligibility for every patient? Why or why not? Would you say there is a difference in assessment rate between patients with specific chief complaints and those presenting for health maintenance/follow-up? Does assessing HBV screening eligibility interfere with other goals of yours? How much more time/resources would be needed to include HBV screening?	- Intention: providers intend to provide underrepresented populations with optimal health care - Goal priority: provider goals (do they include preventative medicine/long term health management?) - Intrinsic motivation: provider's natural stance towards HBV screening at clinic	
Skill: Do you know which form/where on the form to order the test? Do you have patients who refuse HBV screening? If so, do you know why?	- Skills: assess patient eligibility, recommend screening (interpersonal communication), ordering correct labs - Competence: competence in assessing eligibility, recommending screening, ordering labs	

How do you go about addressing screening on a busy day vs. a non-busy day? How difficult is it to develop a screening eligibility assessment routine? Do you have any reminders regarding screening/other preventative medicine recommended screening?	- Interpersonal skills: ability to communicate HBV screening recommendation rationale	
Environmental Constraints: To what extent do physical or resource factors facilitate or impede the assessment of eligibility? Are there *tasks* competing with the assessment of eligibility? How often is time a concern when it comes to screening assessment? For cases where the visit does not have enough time, how often is that a great deal of time? (>20 minutes) For cases where the visit has already gone over time, how much time is usually gone-over? Do you have the necessary resources to assess eligibility in all your patient interviews?	- Resources/material resources: availability and management of resources related to screening (eg. availability of eligibility criteria, availability of other providers who can consult, availability of screening test forms) - Environmental stressors: environmental stressors perceived to influence screening assessment - Person x environment interaction: the interaction between the providers and the environment (eg. patients who have left work to make an appointment, patients with a history of failure to follow-up, patients with difficulty acquiring transportation)	
Social Influences: Do you feel like you have the support system to conduct screening eligibility assessment at each encounter? How often do you consult other physicians/resources per day (or other unit of time/resource)? Did you observe others evaluating screening eligibility? What is the overall climate of the clinic in regard to HBV screening?	- Social support: whether providers have the social support from clinic administrative/opinion leaders to support the assessment. - Leadership: the degree to which opinion leaders/ providers hold in high esteem influence their performance of eligibility assessment - Organizational climate: the clinic's overall attitude regarding HBV screening and whether it has the necessary tools/resources to facilitate screening for every patient - Learning/modeling: whether someone influential helps model the target behavior and influences providers in administration of screening eligibility at every patient encounter	

Mock Data Summary Example: (to be placed above the answers above)

Provider	**Key Domains Engaged**	**Overall theme(s)**	**Representative quote(s)**
Jane Doe, MD	Environmental context	Provider often finds their patient encounters going over time focused on other health concerns.	"I just don't have the time to focus on other issues sometimes. I do make a note of it and recommend the next provider assess for health care maintenance concerns including HTN, DM, and other screening"

Questions:	Responses
How familiar are you with HBV screening eligibility requirements?	*Vaguely familiar insofar as knowing whether the majority of my patients are eligible/ineligible.*

Appendix M: Agency Approval Letter

ORDER OF MALTA®
WESTERN ASSOCIATION U.S.A.
CLINIC OF NORTHERN CALIFORNIA
CELEBRATING 10 YEARS OF SERVICE

3/15/2019

To Whom It May Concern:

This is a letter of support for Joy Umeh.

She will be starting a project for screening Hepatitis B viral infection.

The clinic staff is very enthusiastic about this project.

If you have any questions, please don't hesitate to call me.

Sincerely,

Dr. Vona Lorenzana, M.D.

Interim Medical Director

2121 Harrison St. Suite 120 – Oakland, CA 94612
Phone: (510) 587-3000 – Fax: (510) 587-3003
info@orderofmaltaclinic.com – www.orderofmaltaclinic.com

Appendix N: USPSTF Grade Definitions:

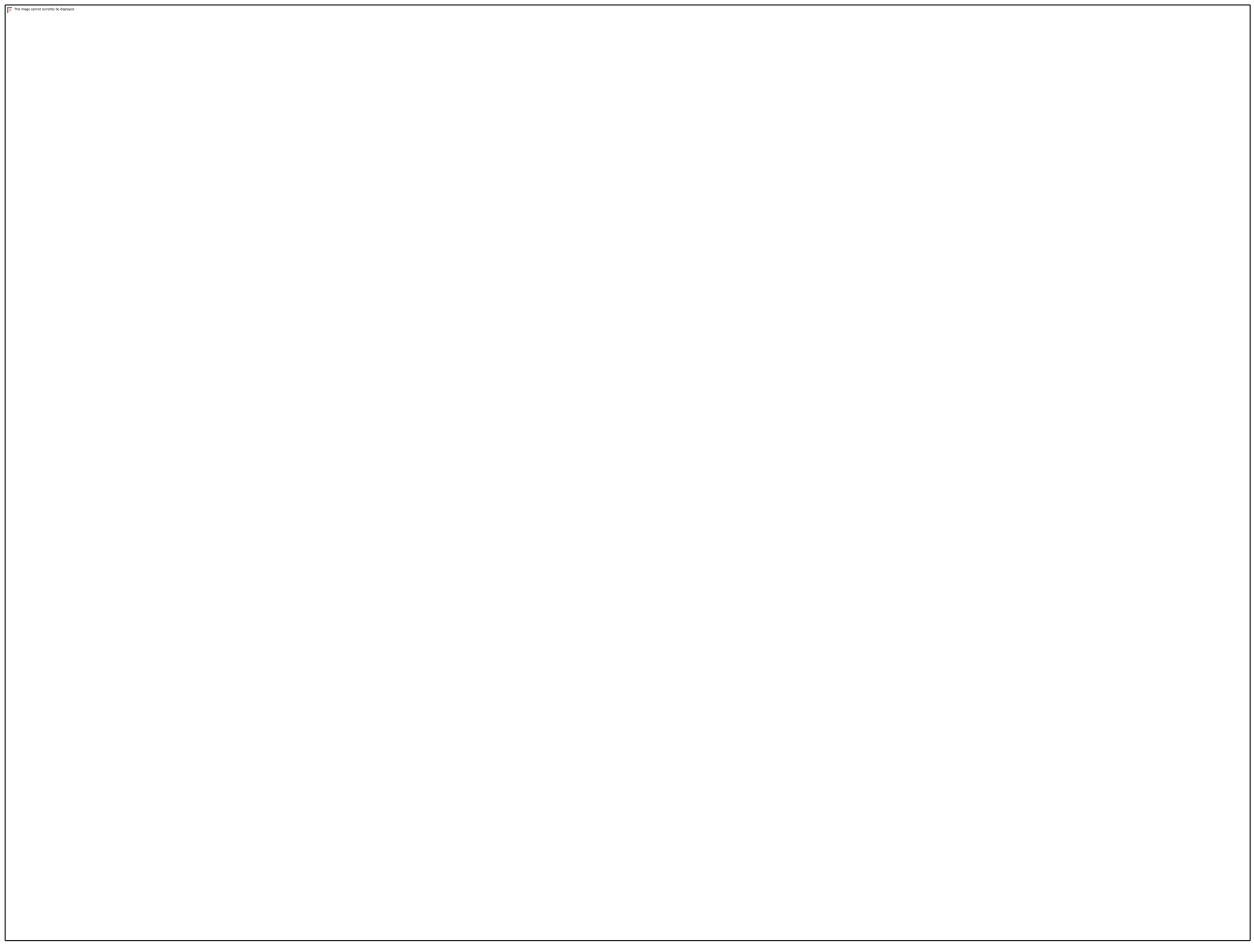
Grade	Definition	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer or provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Offer or provide this service.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.	Offer or provide this service for selected patients depending on individual circumstances.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I Statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the clinical considerations section of USPSTF Recommendation Statement. If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

Appendix O: Screening tool; CDC's Recommendation for Routine Testing and Follow-up for Chronic Hepatitis B Virus Infection

Population	Testing	Vaccination/Follw-up
Persons born in regions of high and intermediate HBV endemicity (HBsAg prevalence ≥2%)	Test for HBsAg, regardless of vaccination status in their country of origin, including immigrants, refugees, asylum seekers and internationally adopted children	If HBsAg-positive, refer for medical management. If negative, assess for on-going risk for hepatitis B and vaccinate if indicated
US born persons not vaccinated as infants whose parents were born in regions with high HBV endemicity (≥8%)	Test for HBsAg regardless of maternal HBsAg status if not vaccinated as infants in the United States	If HBsAg-positive, refer for medical management. If negative, assess for on-going risk for hepatitis B and vaccinate if indicated
Injection-drug users	Test for HBsAg, as well as anti-HBc or anti-HBs to identify susceptible persons	1st vaccine dose should be given same visit as testing. Susceptible persons should complete a 3-dose hepatitis B vaccine series
Men who have sex with men	Test for HBsAg, as well as anti-HBc or anti-HBs to identify susceptible persons	1st vaccine dose should be given same visit as testing. Susceptible persons should complete a 3-dose hepatitis B vaccine series
Persons needing immunosuppressive therapy, including chemotherapy, immunosuppression related to organ transplantation, and immunosuppression for rheumatologic or gastroenterologic disorders	Test for all markers of HBV infection (HBsAg, anti-HBc, and anti-HBs)	Treat persons who are HBsAg-positive. Monitor closely persons who are anti-HBc positive for signs of liver disease
Persons with elevated ALT/AST of unknown etiology	Test for HBsAg along with other appropriate medical evaluation	Follow up as indicated
Donors of blood, plasma, organs, tissues, or semen	Test for HBsAg, anti-HBc, and HBV-DNA as required	
Hemodialysis patients	Test for all markers of HBV infection (HBsAg, anti-HBc, and anti-HBs)	Vaccinate against hepatitis B and revaccinate when serum anti-HBs titer falls below 10mIU/m
All pregnant women	Test for HBsAg during each pregnancy, preferably in the 1st trimester. Test at the time of admission for delivery if prenatal HBsAg test result is not available of if mother was at risk for infection during pregnancy	If HBsAg positive, refer for medical management. To prevent perinatal transmission, infants of HBsAg-positive mothers and unknown HBsAg status mothers should receive vaccination and post-exposure immunoprophylaxis in accordance with recommendations and within 12 hours of delivery
Infants born to HBsAg positive mothers	Test for HBsAg and anti-HBs 1-2 months after completion of at least 3 doses of a licensed hepatitis B vaccine series (ie., at age 9-18 months, generally at the next well-child visit to assess effectiveness of post-exposure immunoprophylaxis). Testing should not be performed before age	Vaccination in accordance with recommendations

	9 months or within 1 month of the most recent vaccine dose	
Household, needle-sharing, or sex contacts of persons known to be HBsAg positive	Test for HBsAg, as well as anti-HBc or anti-HBs to identify susceptible persons	1st vaccine dose should be given same visit as testing. Susceptible persons should complete a 3-dose hepatitis B vaccine series
Persons who are the sources of blood or body fluids resulting in an exposure (e.g., needlestick, sexual assault) that might require post-exposure prophylaxis	Test source for HBsAg	Vaccinate healthcare and public safety workers with reasonably anticipated occupational exposures to blood or infectious body fluids. Provide post-exposure prophylaxis to exposed person if needed
HIV-positive persons	Test for HBsAg, as well as anti-HBc or anti-HBs to identify susceptible persons	Vaccinate susceptible persons against hepatitis B

Appendix P: Poster for Educational Training



Appendix Q: Proforma

Chronic Hepatitis B Project			
	Year 1	**Year 2**	**Year 3**
Cost of HBsAg(a)	$14.20	$15.90	$17.30
Average time spent to order HBsAg (a)	$22.50	24.33	$26.98
Supplies(b&c)	$250.00	$320	$410
Cost of treating chronic hepatitis B (a)	$761	$849	$950
Cost of treating compensated cirrhosis (b)	$227	$372	$428
Cost of treating decompensated cirrhosis (b)	$11,459	$13,238	$15,874
Cost of treating hepatocellular carcinoma (b)	$7,533	$8,422	$9,362
Cost of treating liver transplant (b)	$86,552	$98,265	$111,432
Wages and benefits	$445,000	$467,220	$488,315
Gross revenue	1,100,450	1,321,480	1,492,112
Expenses(a)	$1,047.7	$1,209.23	$1,404.28
Net profit(a)	$654,402.3	$853,050.77	$1002,392.8

The annual cost of treating one case of detected chronic hepatitis B including the test and physician time is estimated at $1047.7. Whereas, if no screening occurred, an asymptomatic patient could progress to decompensated cirrhosis, hepatocellular carcinoma which is estimated at $11,459 and $7,533 respectively.

Option (a) is what this project is recommending, and the cost estimated here is per 1 case of detected chronic hepatitis B.
Option (b) is the cost of treating complications from undetected chronic hepatitis B per case.